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MISCELLANEOUS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

28. Proposed by "IAGO"—(The late DR. JAMES MATTESON, DeKalb Center, Illinois.)

If 9 gentlemen, or 15 ladies, will eat 17 apples in 5 hours, and 15 gentlemen and 15 ladies can eat 47 apples of a similar size in 12 hours, the apples growing uniformly; how many boys will eat up 360 apples in 60 hours, admitting that 120 boys can eat the same number as 18 gentlemen and 26 ladies? *F. P. Matz.*

Solution by Professor **P. S. BERG**, Larimore, North Dakota.

1. Call the original size of an apple an "apple unit."
2. Call the growth of 1 apple in 1 hour one "unit of growth."
3. $32\frac{1}{7}$ boys will in the same time eat as many as 9 gentlemen or 15 ladies.
4. $\therefore$ $32\frac{1}{7}$ boys in 5 hours or $160\frac{5}{7}$ boys in 1 hour$=17$ "apple units"$+85$ "units of growth."
5. $\therefore$ $85\frac{5}{7}$ boys in 12 hours or $1028\frac{4}{7}$ boys in 1 hour$=47$ "apple units"$+564$ "units of growth."
6. $\therefore$ $(4)\times2\frac{13}{17}=444\frac{39}{119}$ boys in 1 hour$=47$ "apple units"$+235$ "units of growth."
7. $\therefore$ $(4)\times6\frac{54}{85}=1066\frac{46}{119}$ boys in 1 hour$=112\frac{4}{5}$ "apple units"$+564$ "units of growth."
8. $\therefore$ $(5)-(6)=584\frac{29}{119}$ boys in 1 hour$=329$ "units of growth."
9. $\therefore$ $(7)-(5)=37\frac{97}{119}$ boys in 1 hour$=65\frac{4}{5}$ "apple units."
10. $\therefore$ $(9)\times15\frac{9}{20}=584\frac{29}{119}$ boys in 1 hour$=1016\frac{61}{100}$ "apple units."
11. $\therefore$ 329 "units growth"$=1016\frac{61}{100}$ "apple units,
    1 "unit growth"$=3\frac{9}{100}$ "apple units."
12. 360 apples in 60 hours$=360$ "apple units"$+21600$ "units growth."
13. 360 "apple units"$=116\frac{156}{309}$ "units growth."
14. $\therefore$ 360 apples in 60 hours$=116\frac{156}{309}+21600=21716\frac{156}{309}$ "units growth."
15. From (8) 1 boy in 1 hour$=\frac{119\times329}{69525}$ "units growth."
16. $\therefore$ 1 boy in 60 hours$=\frac{156604}{4635}$ "units growth."
17. $\therefore$ $21716\frac{156}{309}\div\frac{156604}{4635}=643$ boys.

29. Proposed by **ALEXANDER MACFARLANE, M. A., D. Sc., LL. D.**, Professor of Electrical Engineering in Lehigh University, South Bethlehem, Pennsylvania.

A rectangular room has the four walls, the floor, and the ceiling covered with mirrors; a candle is placed inside the room: find a formula which will express all the images.

Solution by **G. B. M. ZERR, A. M., Ph. D.**, Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas.

Regard the candle as a luminous point. Then, since there are three sets of parallel mirrors, we have, from elementary optics, three sets of an infinite